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**CONTRACT CRYSTAL GROWTH
AND
FABRICATION SERVICES**

Quarterly Technical Report # 7

Period: November 1990 through January 1991

Report Date: February 19, 1991

Contract Number: N00014-89-C-2222

Contributors: J. E. Creamer, R. C. Acklin, M. H. Randles

Prepared by: M. H. Randles
Airtron Division of Litton Systems, Inc.
PO Box 410168
Charlotte, N. C. 28241-0168

Submitted to: Dr. Charles Marquardt, COTR
Naval Research Laboratory
Code 6551
4555 Overlook Ave., SW
Washington, D. C. 20375-5000

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SUMMARY

This program is intended to give the scientists at the Naval Research Laboratory the ability to evaluate new solid state laser crystals. During the seventh quarter of this contract one growth run performed, the eleventh since project start.

CRYSTAL GROWTH

The crystal requested and grown was Erbium Scandium Gallium Garnet (ESGG). The melt composition is listed in Table 1. It was assumed that the distribution coefficients are unity and that the crystal composition will be the same as the melt.

TABLE 1: Composition

<u>Growth Run</u>	<u>Melt composition</u>	<u>Nominal Doping</u> at% (cm ⁻³)
NRL-11	Er ₃ Sc ₂ Ga ₃ O ₁₂	none

The growth conditions are listed in Table 2. The crystal grew well. Some strain and surface cracking exists. The best material is in the center of the boule. No fluorescence was observed with a bright fiber optic inspection light or long wave UV source.

TABLE 2: Growth Conditions

<u>Growth Run</u>	<u>Pull Rate</u> mm/Hr	<u>Rotation</u> RPM	<u>Oxygen</u> %	<u>Average Diameter</u> mm	<u>Length at Diam</u> mm	<u>Fraction Crystallized</u>
NRL-11	3	45	1.5	29	55	.16

PLANS FOR NEXT QUARTER

Work in progress includes fabrication and coating of ESGG, Tm:YAG and titanium doped sapphire parts.



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